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SUPPLEMENTARY EUROPEAN SEARCH REPORT

Application Number
EP 97 92 3593

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US 5 361 238 A (OWECHKO YURI) 1 November 1994 (1994-11-01) * the whole document *	1-3,6,8, 9,25,28	G02B26/00 G11C13/04 G11B7/00 G11B7/09
A	US 3 887 276 A (CLAY BURTON ROSS ET AL) 3 June 1975 (1975-06-03) * column 2, line 20 - column 3, line 22 *	3,13,15	
A	US 4 927 220 A (HESSELINK LAMBERTUS ET AL) 22 May 1990 (1990-05-22) * column 1, line 8 - line 21 * * column 6, line 34 - column 7, line 47 *	5	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

G11C
G11B

The supplementary search report has been based on the last set of claims valid and available at the start of the search.

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Place of search	Date of completion of the search	Examiner
THE HAGUE	19 August 1999	Annibal, P

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C04)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 97 92 3593

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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19-08-1999

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1. A method of holographic recording in a photorefractive medium comprising the steps of:

recording a plurality of servo blocks within an image space in the medium; and

recording a plurality of data pages within the image space in the medium.

2. The method of claim 1 wherein each servo block provides position feedback information and is generated by illuminating the medium with a servo block reference beam and a servo block object beam to effect the migration of charges in the medium, each servo block reference beam and servo block object beam being incident upon a face of the medium at a servo block reference angle, the servo block reference angle defining the angle between the servo block reference beam and the servo block object beam.

3. The method of claim 1 wherein each of the data pages is defined by an interference grating generated by illuminating the medium with a data page reference beam and a data page object beam to effect the migration of charges in the medium, each data page reference beam and data page object beam being incident upon the face of the medium at a data page reference angle, the data page reference beam defining the angle between the data page reference beam and the data page object beam.

4. The method of claim 1 further comprising the step of converting the plurality of servo blocks into a plurality of permanent holograms that cannot be erased by subsequent illumination of the medium.

5. The method of claim 4 wherein the step of converting the plurality of servo blocks further comprises the step of heating the medium.

6. The method of claim 1 wherein the servo blocks provide means for reconstructing one of the data pages with substantially no crosstalk from other data pages.

7. The method of claim 1 wherein each of the servo blocks is located around the periphery of the image space in the medium.

8. The method of claim 2 wherein the servo block object beam and the servo block reference beam are generated with a coherent monochromatic light source.

9. The method of claim 3 wherein the data page object beam and the data page reference beam are generated with the coherent monochromatic light source.

10 The method of claim 2 wherein each of the servo block reference angles is separated by approximately half of a minimum angular spacing of the medium.

11. The method of claim 3 wherein each of the data page reference angles is separated by the minimum angular spacing of the medium.

12. The method of claim 1 further comprising the step of recording an image space identifier within each of a plurality of image spaces in the

medium, each identifier providing means for distinguishing each of the image spaces.

13. The method of claim 12 further comprising the step of converting the image space identifiers into permanent holograms that cannot be erased by subsequent illumination of the medium.

14. A method of holographic recording in a photorefractive medium comprising the steps of:

recording a first servo block in the medium, the first servo block being defined by a first interference grating, the first grating being generated by illuminating the medium with a first reference beam and a first object beam to effect the migration of charges in the medium, the first servo block reference beam and the first servo block object beam being incident upon a face of the medium at a first servo block reference angle, the first servo block reference angle defining the angle between the first servo block reference beam and the first servo block object beam;

recording a second servo block in the medium, the second servo block being defined by a second interference grating, the second grating being generated by illuminating the medium with a second reference beam and a second object beam to effect the migration of charges in the medium, the second servo block reference beam and the second servo block object beam being incident upon the face of the medium at a second servo block reference angle, the second servo block reference angle defining the angle between the second servo block reference beam and the second servo block object beam;

recording a third servo block in the medium, the third servo block being defined by a third interference grating, the third grating being

generated by illuminating the medium with a third reference beam and a third object beam to effect the migration of charges in the medium, the third servo block reference beam and the third servo block object beam being incident upon the face of the medium at a third servo block reference angle, the third servo block reference angle defining the angle between the third servo block reference beam and the third servo block object beam;

recording a fourth servo block in the medium, the fourth servo block being defined by a fourth interference grating, the fourth grating being generated by illuminating the medium with a fourth reference beam and a fourth object beam to effect the migration of charges in the medium, the fourth servo block reference beam and the fourth servo block object beam being incident upon the face of the medium at a fourth servo block reference angle, the fourth servo block reference angle defining the angle between the fourth servo block reference beam and the fourth servo block object beam;

recording a fifth servo block in the medium, the fifth servo block being defined by the first interference grating, the fifth servo block being generated by illuminating the medium with the fifth reference beam and the fifth object beam to effect the migration of charges in the medium, the fifth servo block reference beam and the fifth servo block object beam being incident upon the face of the medium at a fifth servo block reference angle, the fifth servo block reference angle defining the angle between the fifth servo block reference beam and the fifth servo block object beam;

recording a first data page in the medium, the first data page being defined by a first data page interference grating, the first data page grating being generated by illuminating the medium with a first data page reference beam and a first data page object beam to effect the migration of charges in the medium, the first data page reference beam and the first data page object beam being incident upon the face of the medium at a first data page

reference angle, the first servo block reference angle defining the angle between the first data page reference beam and the first data page object beam;

recording a second data page in the medium, the second data page being defined by a second data page interference grating, the second data page grating being generated by illuminating the medium with a second data page reference beam and a second data page object beam to effect the migration of charges in the medium, the second data page reference beam and the second data page object beam being incident upon the face of the medium at a second data page reference angle, the second data page reference angle defining the angle between the second data page reference beam and the second data page object beam; and

recording a third data page in the medium, the third data page being defined by a third data page interference grating, the third data page grating being generated by illuminating the medium with a third data page reference beam and a third data page object beam to effect the migration of charges in the medium, the third data page reference beam and the third data page object beam being incident upon the face of the medium at a third data page reference angle, the third data page reference angle defining the angle between the third data page reference beam and the third data page object beam.

15. The method of claim 14 further comprising the step of converting each of the servo blocks into holograms that cannot be erased by subsequent illumination;.

16. The method of claim 14 wherein the second and third servo blocks provide position feedback information during reconstruction of the first data page.

17. The method of claim 14 wherein the fourth and fifth servo blocks provide position feedback information during reconstruction of the second data page.

18. The method of claim 14 wherein each of the servo blocks is defined by one of five patterns.

19. The method of claim 18 wherein each of the five patterns is recorded about a periphery of the image space.

20. The method of claim 18 wherein each of the five patterns is defined by a five spot arrangement.

21. The method of claim 14 wherein the reference beams, object beams, data page reference beams and data page object beams are each propagated with a same wavelength.

22. The method of claim 14 wherein adjacent data pages are recorded at an angular spacing of a minimum angular spacing of the crystal.

23. The method of claim 14 wherein adjacent servo blocks are recorded at angular increments of approximately one-half of the minimum angular spacing.

24. A method for retrieving holograms recorded within an image space in a photorefractive medium comprising the steps of:

recording a plurality of servo blocks within the image space in the medium, each servo block containing position feedback information and being defined by an interference grating generated by illuminating the medium with a servo block reference beam and a servo block object beam to effect the migration of charges in the medium, each servo block reference beam and servo block object beam being incident upon a face of the medium at a servo block reference angle, the servo block reference angle defining the angle between the servo block reference beam and the servo block object beam;

converting each of the plurality of servo blocks into permanent spatially varying index of refraction patterns in the medium that cannot be erased by subsequent illumination;

recording a plurality of data pages within the image space in the medium, each of the data pages being defined by an interference grating generated by illuminating the medium with a data page reference beam and a data page object beam to effect the migration of charges in the medium, each data page reference beam and data page object beam being incident upon the face of the medium at a data page reference angle, the data page reference beam defining the angle between the data page reference beam and the data page object beam;

reconstructing one of the data pages and position feedback information on a detector array by propagating the data page reference beam at the face of the medium at a reference angle; and

adjusting the data page reference angle in response to the position feedback information.

25. A method of holographic recording in a photorefractive medium comprising the steps of:

recording a plurality of servo blocks within an image space in the medium, each servo block providing position feedback information and being defined by an interference grating generated by illuminating the medium with a servo block reference beam and a servo block object beam to effect the migration of charges in the medium, each servo block reference beam and servo block object beam being incident upon a face of the medium and defined by a servo block reference wavelength; and

recording a plurality of data pages within the image space in the medium, each of the data pages being defined by an interference grating generated by illuminating the medium with a data page reference beam and a data page object beam to effect the migration of charges in the medium, each data page reference beam and data page object beam being incident upon the face of the medium and defined by a data page reference wavelength.

26. The method of claim 24 wherein a servo block reference angle defined between each servo block reference beam and each servo block object beam remains fixed.

27. The method of claim 24 wherein a data page reference angle defined between each data page reference beam and each data page object beam remains fixed.

28. An apparatus for retrieving holograms recorded with position feedback information within an image space in a photorefractive medium comprising:

means for generating a beam of light;

means for splitting the beam of light into an object beam and a reference beam;

a spatial light modulator for modulating the object beam;

optical means for directing the object beam and reference beam incident upon a face of the medium at a reference angle therein between;

a detector array for converting the optical signal to an electrical signal; and

means for receiving the position feedback information and adjusting the reference angle in response to the position feedback information.

29. A method for retrieving holograms recorded within a plurality of image spaces in a photorefractive medium comprising the steps of:

recording a plurality of servo blocks within the image spaces in the medium, each servo block containing position feedback information and being defined by an interference grating generated by illuminating the medium with a servo block reference beam and a servo block object beam to effect the migration of charges in the medium, each servo block reference beam and servo block object beam being incident upon a face of the medium at a servo block reference angle, the servo block reference angle defining the angle between the servo block reference beam and the servo block object beam;

converting each of the plurality of servo blocks into permanent spatially varying index of refraction patterns in the medium that cannot be erased by subsequent illumination;

recording an image space identifier within each of the image spaces, each identifier providing means for distinguishing each of the image spaces;

recording a plurality of data pages within the image spaces in the medium, each of the data pages being defined by an interference grating generated by illuminating the medium with a data page reference beam and a data page object beam to effect the migration of charges in the medium, each data page reference beam and data page object beam being incident upon the face of the medium at a data page reference angle, the data page reference beam defining the angle between the data page reference beam and the data page object beam;

reconstructing one of the data pages and position feedback information from an image space, on a detector array, by propagating the data page reference beam at the face of the medium at a reference angle; and

adjusting the data page reference angle in response to the position feedback information.